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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/581,133	05/30/2006	Rafat Ata Mustafa Hikmet	NL 031390	3745

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS
P.O. BOX 3001
BRIARCLIFF MANOR, NY 10510

EXAMINER	
ROY, SIKHA	

ART UNIT	PAPER NUMBER
2879	

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11/18/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/581,133	HIKMET ET AL.	
	Examiner	Art Unit	
	Sikha Roy	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 August 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The Amendment, filed on August 24, 2009 has been entered and acknowledged by the Examiner.

The new title has been entered and approved by the Examiner.

Claims 1-13 are pending in the instant application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4,6-10, 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Pub 2003/0042850 to Bertrum et al., and further in view of US Pub 2004/0023010 to Bulovic et al.

Regarding claim 1 Bertrum discloses (para [0006] – [0009], [0023],[0025],[0029]) a method comprising the steps of providing an organic matrix 3 of polymeric organic material with embedded quantum dots, providing one or more transfer molecules (capping molecules) on the surface of the quantum dots, supplying electrons and holes to the matrix using first and second electrical contacts 2,4 in electrical contact with the organic matrix, generating excitons, and transferring excitons from EL organic molecule

to transfer molecules on the quantum dots and transferring excitons from the transfer molecules to the quantum dots.

Bertrum discloses polymer organic material for organic matrix but does not explicitly disclose organic matrix comprising electroluminescent organic molecules.

Bulovic in same field of endeavor of light emitting device including semiconductor nanocrystals discloses (para [0046]-[0048]) dispersing nanocrystals (quantum dots) in a matrix of hole transport organic layer (HTL) and thus forming matrix of organic molecules embedded with quantum dots so that charge can be directly injected into the nanocrystal from the host matrix. This method of dispersion including nanocrystals in a HTL not only circumvents the relatively poor conduction observed in nanocrystal solids but also reduces the number of pinhole shorts in the emissive layer, thus providing an efficient light emitting device.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to specify the organic matrix of polymeric organic material of Bertrum as organic hole transport layer (HTL) embedded with quantum dot as suggested by Bulovic for improving relatively poor conduction observed in quantum dots and reducing the number of pinhole shorts in the emissive layer. Conductive electroluminescent poly phenylene vinylene (PPV) is a well known organic hole transport material as evidenced by Bertrum(para [0020]). It has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. Thus, it would have been obvious to one having ordinary skills in the art at the time the invention was made to have electroluminescent

organic matrix of PPV for the organic matrix of Bertrum and Bulovic, since the selection of known materials for a known purpose is within the skill of the art.

Regarding claim 2 Bulovic discloses (para [0046]-[0048]) dispersing nanocrystals (quantum dots) in a solution of organic molecules and thus forming matrix of organic molecules embedded with quantum dots.

Regarding claim 3 Bertrum discloses the hole and electron processing means each comprising two layers hole injecting on the substrate and hole transporting and electron injecting and electron transporting on the top of light emitting layer, the electron and hole blocking (transporting) layers being adjacent to the matrix.

Regarding claims 4, 6 and 7 Bertrum discloses (para [0020]-[0025]) one or more transfer molecules comprising fluorine polymer, fluorine oligomer, the quantum dots comprising CdSe and EL organic molecules comprising poly(phenylene vinylene) or PPV. These compounds being same as those disclosed by the applicant it is anticipated that Bertrum discloses transfer molecules have a bandgap smaller than the bandgap of EL organic molecule (HTL of PPV) and larger than the band gap of quantum dots, transfer rate of excitons from EL organic molecules to transfer molecules is larger than decay rate of excitons in EL organic molecules and transfer rate of excitons from transfer molecules to the quantum dots is larger than the decay rate of excitons in the transfer molecules.

Claim 8 essentially recites the same limitations as of claim 1 and claim 6 for quantum dot embedded organic molecule device and hence is rejected for the same reason.

Claim 9 essentially recites the same limitation as of claim 7 for the device and hence is rejected for the same reason.

Regarding claim 10 Bertrum discloses the EL organic molecules (PPV) are electroluminescent polymers.

Regarding claim 11 Bertrum and Bulovic disclose the method of fabricating light emitting quantum dot embedded organic device comprising the steps of providing a solution of EL organic molecules and solution of quantum dots with transfer molecules attached to the surfaces (transfer molecules : fluorine polymer , organic EL molecule: PPV and quantum dots: CdSe – having the same compositions as those disclosed by the applicant possess the band gaps such that $E_{transfer} < E_{org.mol.}$ and $E_{transfer} > E_{QD}$) , mixing the solutions, providing first electrical contact and forming the matrix of organic EL molecules with embedded quantum dots on the first electrical contact and depositing the second electrical contact on the matrix.

Regarding claim 12, Bertrum discloses the process further comprises steps of forming between the matrix and the first/second electrode a material layer for enhancing hole transport.

Regarding claim 13, Bertrum discloses the process further comprises steps of forming between the matrix and the second/first electrode a material layer for enhancing electron transport.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Pub 2003/0042850 to Bertrum et al., US Pub 2004/0023010 to Bulovic et al. and further in view of US Pub 2003/0099860 to Lin et al.

Regarding claim 5 Bertrum as modified by Bulovic discloses ([0023]-[0025]) different fluorescent transfer molecules such as perylene derivative, DCM, coumarine but does not exemplify selecting phosphorescing transfer molecules.

Lin in analogous art of organic EL device discloses (para [0033]) DCM, Coumarin, perylene or phosphorescent medium can be used as luminescent medium and hence these are recognized as art equivalents.

It would have been obvious to one of ordinary skill in the art at the time of invention to use phosphorescing transfer molecules as suggested by Lin instead of fluorescent transfer molecules of Bertrum since these are art recognized equivalents for luminescent material.

Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Pub 2003/0042850 to Bertrum et al., and further in view of Mattoussi et al. (J. Applied Physics 1999, 86,4390-4399).

Regarding claim 1, Bertrum discloses (para [0006] – [0009], [0023],[0025],[0029]) a method comprising the steps of providing an organic matrix 3 of polymeric organic material with embedded quantum dots, providing one or more transfer molecules (capping molecules) on the surface of the quantum dots, supplying electrons and holes to the matrix using first and second electrical contacts 2,4 in electrical contact with the organic matrix, generating excitons, and transferring excitons from EL organic molecule to transfer molecules on the quantum dots and transferring excitons from the transfer molecules to the quantum dots.

Bertrum discloses polymer organic material for organic matrix but does not explicitly disclose organic matrix comprising electroluminescent organic molecules.

Mattoussi in same field of endeavor discloses (page 4390,4391Fig.7) LED made of composite film of electroluminescent organic material such as poly(N-vinylcarbazole) (PVK), phenylbiphenyloxadiazole (PBD), polyphenylene vinylene (PPV) and CdSe nanocrystals. Mattoussi teaches these polymers can be tailored to provide surface passivation of the nanocrystal and charge transport into the particle core where recombination takes place and provides higher EL emission efficiency.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to specify the organic matrix of polymeric organic material of Bertrum as organic electroluminescent matrix embedded with quantum dot as suggested by Mattoussi for providing surface passivation of the quantum dots (nanocrystal) and charge transport into the particle core where recombination takes place and providing higher EL emission efficiency.

Response to Arguments

Applicant's arguments with respect to claim1 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (571) 272-2463. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (571) 272-2457. The fax phone number for the organization is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Sikha Roy/
Primary Examiner, Art Unit 2879